

FUNCTIONAL / FLEXIBILITY /



Nine attributes of adaptable
hospital spaces

by Tom E. Harvey Jr., AIA, FACHA, and Debajyoti Pati, Ph.D., AIAA



When 50 administrators and clinicians at six of the nation's top hospitals were asked in a survey by researchers at the architectural firm HKS Inc., Dallas, to describe what flexibility means relative to inpatient unit design, the response was enlightening.

Seven out of 10 viewed flexibility as adaptability. Why is this important to designers and hospital decision-makers alike? To create a viable unit with flexibility and adaptability, the two design participants must be speaking the same language. Clinicians place higher priority on short-term flexibility—demanding immediate adaptability—while designers often think of longer-term flexibility for operational change.

The nine attributes

The study points out nine attributes that ensure flexibility of operations in the short and long term and design strategies that can help make the attributes work. They include the following:

1 MULTIPLE DIVISION AND ZONING OPTIONS. Based on geographic and physical design characteristics of the unit, the nursing management divides the unit into groups of rooms with corresponding support core

Peer lines of sight were incorporated into the initial design at Laredo Medical Center in Laredo, Texas.

Functional flexibility



Clarian West Medical Center in Avon, Ind., has standardized rooms to allow flexibility for moving services as needs dictate.

areas. Different care models demand different ways of zoning patient rooms and the corresponding nursing support rooms. Greater latitude in dividing or zoning the patient rooms and the nursing support rooms enhance the flexibility of assignments.

Management routinely assigns nurses and care teams within a group of patients with the intent of balancing acuity load. The physical location of these patients is important to reduce walking distances, but room assignments are rarely contiguous. Staffing ratios are likely to change over the life of a facility and therefore should not be the sole factor when designing a unit. More importantly, the ratio should not drive aggressive design concepts that create groupings such as pods, which often lead to poor lines of sight throughout the unit.

WHAT WORKS:

- Multiple locations for caregiving administrative work—at the bedside, near the patient room but out of direct contact with the patient and in locations offering consultation opportunities in larger groups away from the patient. Many designs seek to eliminate the traditional nurses' station, but there is a need to maintain some gathering place for caregivers as well as a workplace for physicians.

- Options for zoning the support core

in relation to groups of patient rooms.

- Unit configurations that offer standardization in the location and size of patient rooms and support spaces.

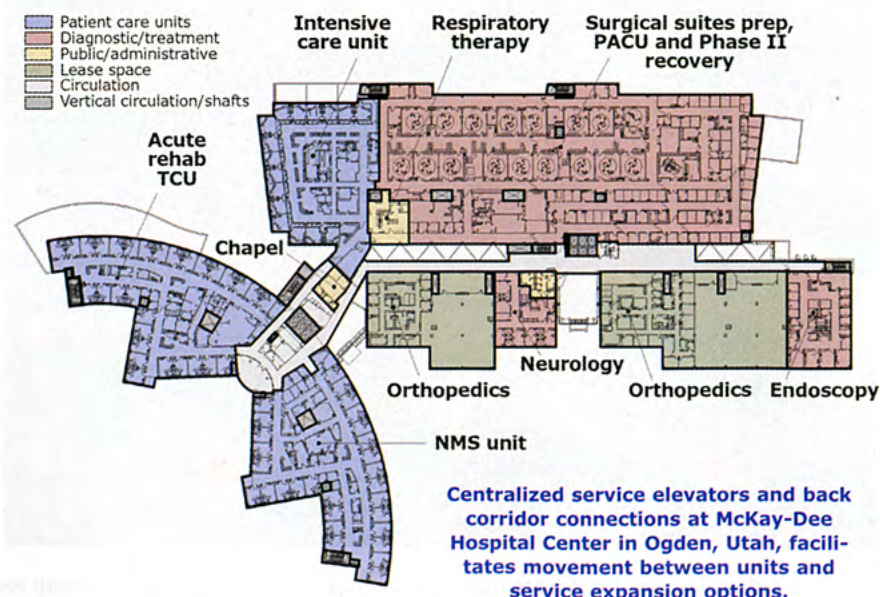
- Axial correspondence between the support core and groups of patient rooms to better facilitate each group and reduce nurse travel distances.

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2 PEER LINES OF SIGHT. Direct visibility of peers enhances the perception of operational flexibility and efficiency

and provides a sense of security for caregivers. Obstructed sight lines increase stress by reducing the perceived and actual availability of help and opportunities for mentoring and socialization.

The contemporary practice in health care design is to shift the principal work zones of the caregiver closer to the patient by providing documentation areas and supplies storage closer to patient rooms. This is essential for minimizing travel distances and increasing direct



Centralized service elevators and back corridor connections at McKay-Dee Hospital Center in Ogden, Utah, facilitates movement between units and service expansion options.

care time available to patients. However, design of these work areas is critical to the nurses' sense of flexibility. Embedding these work areas too deeply out of the line of sight, down corridors or in areas comprising blind corners off of the racetrack, suggests a lack of support team availability to caregivers.

Interestingly, feedback from caregivers also concluded that gently curved corridors—designed to give an elegant exterior form and minimize the perception of corridor length on the interior—impedes peer visibility throughout the unit.

WHAT WORKS:

- Simply shaped unit configurations that permit as much distal visibility as possible;
- Corner locations of work stations within the support core; and
- Backstage corridors linking caregiver stations that may be designed within the core space.

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3 PATIENT VISIBILITY.

Higher acuity in medical-surgical units combined with an aging patient population necessitates better sensory links to patient rooms; a factor with considerable impact on operational flexibility. Nursing assignment frequently involves noncontiguous patient rooms where sensory links could be obstructed. In other words, the more open the unit, the more flexible.

Given increasing patient acuity and the fact that nurses often have patients in multiple locations on a floor, direct visibility of the patient through the doorway from the corridor and from the documentation station outside the room are minimal requirements. Other efforts to yield more openness throughout the unit can include views to patient rooms from the charting stations, medication stations and utility room doorways.

WHAT WORKS:

- Multiple caregiver work centers with proximal patient room locations so that shifts with fewer staff who may congregate periodically will still keep an eye and ear on the unit territory;
- Unobstructed lines of sight between nurse work zones and the patient room doors; and

- Outboard location of patient room toilet/shower rooms

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4 PROXIMITY OF SUPPORT. Perceived and actual unnecessary walking distances are among the predominant factors affecting operational flexibility for nursing and support staff. Both nurses and architects have consistent ideas on solving this. The solution is to design built-in cabinets or mobile carts in patient rooms allowing storage capacity outside or inside the room.

Issues such as inventory control, rota-

space, staffing and equipment costs still drive this equation.

WHAT WORKS:

- A simply shaped patient unit (square, rectangle, triangle) with symmetrically designed support cores.
- Association of distributed supply areas with the caregiver workstations, whether at bedside, room-side or in team work areas in the core.
- Decentralized room-side supply cabinets, also known as nurse servers.
- Correspondence between the axis of the support core and the unit as a whole.

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5 RESILIENCE TO MOVING, RELOCATING AND INTERCHANGING UNITS.

The ability to move services across floors or units enhances efficiency and flexibility, especially because census fluctuation through the year can be significant. Standardized units provide one example in which the physical design significantly enhances the operational flexibility to move or relocate.

Designing similar unit plans in an adjacent position on the same floor appears to be beneficial in enhancing flexibility. However, this is only beneficial where the linkage is through a nonpublic corridor. Such an arrangement, if sufficiently close, can allow an occasional swing of patient load between the units and better support a longer-term growth in census within a service.



Universal rooms in Parker Adventist Hospital, Parker, Colo., provide the ability to move and interchange units.

tion and charge capture, construction cost and restocking continue to be considerations affecting this decision. However, such design and operational practice will usually reduce aggregate daily travel distances for nurses.

Another challenge that warrants more research is locating patient medications at the bedside. Departmental control of

/ MORE ABOUT THE STUDY /

The study that is the basis for this article, "Inpatient Unit Design: Defining the Design Characteristics of a Successful Adaptable Unit," was conducted through an American Institute of Architects research grant with support from Herman Miller Inc., Zeeland, Mich.; University of Texas Arlington School of Nursing and Georgia Tech College of Architecture, Atlanta.

Participating hospitals included Parker Adventist Hospital, Parker, Colo.; Clarian West Medical Center, Avon, Ind.; Laredo Medical Center, Laredo, Texas; McKay-Dee Hospital Center, Ogden, Utah; Bon Secours St. Francis Hospital, Charleston, S.C.; and St. Rose Dominican Hospital—Siena Campus, Henderson, Nev.

For a copy of the study, write to co-author Debajyoti Pati, Ph.D., AIIA, director of research at Dallas-based HKS Inc., at dpati@hksinc.com.

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Functional flexibility

WHAT WORKS:

- Standardized units with consistency in patient room location and support core layout.

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6 EASE OF MOVEMENT BETWEEN UNITS AND DEPARTMENTS.

Personnel responsible for several units within the hospital are required to travel to several areas in a time-efficient manner. Proximal location of the vertical circulation core, back corridor links between units, and communicating stairs linking vertically stacked units are examples of designs that enhance operational flexibility of nurse managers, pharmacists, respiratory therapists and other personnel.

Direct, easy circulation between units strongly facilitates flexibility. This is more critical for ancillary caregivers, physicians, support personnel and nurse managers than the general floor nurse because of their need to cross over be-

tween units. Strong consideration should be given to providing a central circulating stair linking floors of a bed tower, regardless of whether or not it serves a life-safety egress function.

WHAT WORKS:

- Central location of vertical circulation core, keeping in mind that patient transport is more cumbersome and impactful than material transport;
- Back corridor links between horizontally adjacent units; and
- Central communicating stairs between vertically stacked units.

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7 MULTIPLE ADMINISTRATIVE CONTROL AND SERVICE EXPANSION OPTIONS.

Mismatch between the administrative unit and the physical unit could result in a substantial impact on operational flexibility. Units that allow service resizing by spreading into adjoining units, for instance, help facilitate flexibility.

QUESTIONS OF / ADAPTABILITY /

When attempting to plan for adaptability in a hospital construction project, the design team should consider the following questions:

- 1 / To what extent will the unit configuration allow flexibility for subdividing the units when incorporating nursing support areas?
- 2 / From various nurse work zones, to what extent does the design enable visibility of peers within one's general cone of vision? How many peer locations are visible from each nurse work location? Are there potential blind spots?
- 3 / From various nurse work zones, how many of the patient rooms are visibly or audibly obstructed? Are there certain unit designs in which room assignments can spill over corners?
- 4 / For each group of rooms intended for nursing assignment, how proximate is the assigned nursing support areas? Is there undue walking involved when gaining access to support services?
- 5 / To what extent will the unit design support different types of patients?
- 6 / To what extent does the design of the floor on which the unit is situated allow for resizing of services in response to census changes? To what extent does the floor design provide convenience to administrative areas?
- 7 / To what extent will the design of horizontal pathways and vertical transportation systems reduce physical demand on personnel servicing multiple units and departments?
- 8 / To what extent can shapes and sizes of rooms in the support core, cabinetry and shelving be modified over time? Can the walls in the support core be modified with minor expenditures to accommodate new equipment? Can new rooms be created easily within the existing core area to accommodate new functions?
- 9 / To what extent can the support core be expanded? Can new spaces be created to accommodate new functions and activities?—T.E.H. & D.P.

Mixing of services on a nursing floor can contribute to confusion and patient assignment challenges. The ability to identify subzones within a floor may help meet this need, which is often related to census fluctuations. This can be addressed in the proposed size of the bed unit or in design configurations that allow subzoning without visibility and assignment issues.

WHAT WORKS:

- Back corridor linkage between horizontally adjacent units; and
- The ability to create subzones of patient services within a unit that are perceivable by staff as their zone through visual or geographic cues.

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8 FLEXIBLE SUPPORT CORE ELEMENTS. There is a more-than-occasional need for adjustment in the use of support core space arising from changes in equipment, operations and management. Supply storage room design often needs rethinking due to changes in inventory management systems and the design of supply packaging.

The size, shape and quantity of consumable goods, reprocessible items and portable medical equipment to be centrally held on a bed unit changes on a regular basis. As a result, support core space needs modifications. Built-in cabinetry offers limited flexibility and adaptability. There is an entire industry of products that have been specifically designed to address the need of flexibility in storage accommodations.

In basic supply holding areas—such as clean and soiled utility rooms and equipment holding rooms—modular, moveable compartments or cart systems offer adaptability and the benefit of easy removal for thorough periodic cleaning. Similarly, for the material holding areas of medication and nourishment rooms, the same modular, moveable systems should be employed.

Unusual geometries designed into many of today's inpatient care units have a downside of unusually shaped spaces as the core area gets defined into a myriad of required support spaces. Smaller, dedicated storage spaces should be avoided unless code-required. These smaller rooms can limit flexibility. Simi-

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larly, odd-shaped rooms may limit their capacity for modular or systems-based storage.

WHAT WORKS:

- Rolling stock for shelving or move-

able modular shelving and cabinetry in supply rooms;

- Design efforts that organize to minimize walls containing mechanical-electrical-plumbing elements to more easily

permit partition relocation; and

- Assurance that usable wall area implied by programmed square footage is available on the final configuration.

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9 EXPANDABLE SUPPORT CORE.

Over time, operational changes demand more space in the support core. An example is when services like respiratory therapy and pharmacy are decentralized and moved to the inpatient units. The ability to expand and support the core over time could considerably enhance unit flexibility and maintain operational efficiency over the long run.

In addition to designing adjacency of bed units for overflow support space capacity, another programming and design concept that lends exceptional flexibility is the provision for a large, hotel-type unassigned space on each floor of the unit. This space offers two points of flexibility. First, it can accommodate a specialty support function for the clinical service assigned to that floor. Second, it can serve as an equipment or technology garage to hold many of the necessary support tools used infrequently in today's inpatient care units.

WHAT WORKS:

- Design of adjoining spaces that can serve as an extension of support core space, which is highly useful for shared support elements between units; and
- Provision of a "loose" program approach of unassigned space that will typically find an appropriate use before schematic design is complete.

Adaptability is key

The study found that adaptability is the most desired form of flexibility from an operational viewpoint. This refers to the capability of making operational changes without construction. Understanding this confirms the inherent need to cre-

ate ground rules or design considerations for inpatient design. ■



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